

REMARKS/ARGUMENTS

In the Office Action of November 17, 2010, claims 1-3, 5-10, 12 and 14-21 were rejected. However, Applicants hereby request reconsideration of the application in view of the below-provided remarks.

On February 8, 2011, a telephone interview between the undersigned attorney and Examiners Trang Q. Tran and Cuong Q. Nguyen was conducted. In the telephone interview, proposed amendment to independent claim 1 with respect to the cited references of En et al. and Krivokapic was discussed. However, no agreement with respect to allowability of the pending claims was reached.

Claim Rejections under 35 U.S.C. 103

Claims 1-3, 5-10, 12, 14-16 and 18-21 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En et al. (U.S. Pat. No. 6,441,433, hereinafter “En”) in view of Krivokapic (U.S. Pat. No. 6,888,198). Claim 17 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En in view of Krivokapic, and further in view of Pellerin et al. (WO 02/075781 A2, hereinafter “Pellerin”). However, Applicants respectfully submit that the pending claims are patentable in view of the cited references for the reasons provided below.

Independent Claim 1

Claim 1 recites in part:

“A semiconductor device comprising a silicon-containing semiconductor body with a surface, which semiconductor body is provided, near the surface thereof, with a transistor comprising: a gate situated at the surface and having a side wall spacer on either side of the gate, and further comprising, on either side of the gate, a diffusion region formed in the semiconductor body, at least one diffusion region being provided at the surface of the semiconductor body with a silicide region, characterized in that the silicide region extends along the surface of the semiconductor body and continues for more than 10 nm under the side wall spacer, wherein the side wall spacer is L-shaped and comprises a first portion, which borders on the gate and extends substantially perpendicularly with respect to the surface of the semiconductor body, and a second portion which extends along the surface of the semiconductor body, wherein the silicide region is completely below the side wall spacer, wherein the side wall spacer is configured to directly contact the entire surface of a side of the gate, and wherein the side wall spacer is made of one material.” (emphasis added).

Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1. Specifically, Applicants respectfully assert that the Examiner failed to address the limitations “*the silicide region is completely below the side wall spacer, wherein the side wall spacer is configured to directly contact the entire surface of a side of the gate, and wherein the side wall spacer is made of one material*” as recited in claim 1. (See the rejection to claim 1 on pages 2 and 3 of the Office Action.) In fact, the Office Action does not even acknowledge the above-identified limitations of claim 1. (See pages 2 and 3 of the Office Action.)

MPEP §2142 states:

“The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.” (emphasis added).

Because the Examiner failed to address the above-identified limitations of “*the silicide region is completely below the side wall spacer, wherein the side wall spacer is configured to directly contact the entire surface of a side of the gate, and wherein the side wall spacer is made of one material*” as recited in claim 1, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, Applicants respectfully submit that the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, the teachings of En in view of Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claim 1.

In order to establish a *prima facie* rejection of a claim under 35 U.S.C. 103, the Office Action must present a clear articulation of the reason why the claimed invention would have been obvious. MPEP 2142 (citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. (2007)). The analysis must be made explicit. Id. Additionally, rejections based on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. Id.

The Office Action admits that En does not teach the limitation “*the silicide region extends along the surface of the semiconductor body and continues for more than 10 nm under the side wall spacer*” as recited in claim 1. (See page 3 of the Office Action). The Office Action concludes that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicide region continues for more than 10 nm under the side wall spacer, in order to optimize the performance of the device” (emphasis added). (See page 3 of the Office Action). In addition, the Office Action states that “it has been held that discovering the optimum or workable ranges involves only routine skill in the art...” (See page 3 of the Office Action).

Applicants respectfully assert that the assertion “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicide region continues for more than 10 nm under the side wall spacer, in order to optimize the performance of the device” of the Office Action is a mere conclusory statement.

The Office Action merely provides a vague conclusory statement to support the asserted conclusion of obviousness. Specifically, the Office Action does not describe what performance is being optimized. In addition, the Office Action does not describe why the modification of the teachings of En would “optimize the performance of the device” (emphasis added), as asserted by the Examiner. Thus, the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Applicants respectfully assert that the assertion “it has been held that discovering the optimum or workable ranges involves only routine skill in the art...” of the Office Action is not based on a rational underpinning.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine

experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See MPEP 2144.05(II)(B).

In the case at hand, there is no mention in En that the distance of the silicide regions (48/54) under the spacers (58) is a result-effective variable. Since the distance of the silicide regions (48/54) under the spacers (58) is not recognized as a result-effective variable in En, the claimed distance cannot be characterized as routine experimentation. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

The Office Action also admits that En does not teach the limitation “*the side wall spacer is L-shaped*” as recited in claim 1. (See page 3 of the Office Action). The Office Action further states:

“Fig. 1 of Krivokapic teaches it is known in the art to provide a side wall spacer (350/359a/357a) is L-shaped.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the L-shape of the side wall of Krivokapic in En, in order to isolate the active element.

Furthermore, the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant. See *In re Dailey*.”

However, Applicants respectfully assert that the assertion “it is known in the art to provide a side wall spacer (350/359a/357a) is L-shaped” of the Office Action is not supported by fact and thus is not based on a rational underpinning.

In the telephone interview conducted between the undersigned attorney and Examiners Trang Q. Tran and Cuong Q. Nguyen on February 8, 2011, Examiner Trang Q. Tran alleged that the nitride layer (48) of Krivokapic is an L-shaped side wall spacer. However, Applicants respectfully assert that the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer.

Specifically, Krivokapic teaches that the nitride layer (48) is formed on an oxide layer (46) as well as the sidewalls of a gate electrode (36) and that the nitride layer (48) may be made of silicon nitride, silicon oxynitride, or the like. (See Fig. 1 and column 4, lines 5-10). In addition, Krivokapic teaches that spacers (50) extend upward from the upper surface (52) of the nitride layer (48) and cover the sidewalls of the nitride layer

(48). (See Fig. 1 and column 4, lines 11-15). That is, Krivokapic teaches that spacers (50) are formed adjacent to the nitride layer (48).

Because Krivokapic teaches that spacers (50) are formed adjacent to the nitride layer (48), the nitride layer (48) of Krivokapic is not a spacer. Thus, Applicants respectfully assert that the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer. Because the Office Action relies on the nitride layer (48) of Krivokapic support the assertion “it is known in the art to provide a side wall spacer (350/359a/357a) is L-shaped” and the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer, Applicants respectfully assert that the above-identified assertion of the Office Action is not supported by fact and thus is not based on a rational underpinning.

In addition, Applicants respectfully assert that the assertion “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the L-shape of the side wall of Krivokapic in En, in order to isolate the active element” of the Office Action is a mere conclusory statement.

The Office Action merely provides a conclusory statement to support the asserted conclusion of obviousness. Specifically, a spacer with any shape may be used to “isolate the active element” (emphasis added), as asserted by the Examiner. Because a spacer with any shape may be used to “isolate the active element” (emphasis added), as asserted by the Examiner, the Office Action’s assertion fails to explain why an L shaped spacer is selected. Thus, the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Furthermore, Applicants respectfully assert that there is persuasive evidence in Applicants’ specification that the L-shape of the side wall spacer is significant.

With regard to the assertion “the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant” of the Office Action, Applicants respectfully submit that there is persuasive

evidence in Applicants' specification that the L-shape of the side wall spacer is significant.

For example, Applicants' specification describes that the L-shaped side wall spacer has the advantage that the dimensions of the amorphous region can be controlled so that the extension of the amorphous region under the side wall spacer is provided in a controlled manner and that as a result, the silicide region is formed over a longer distance under the side wall spacers. (See Applicants' specification at Fig. 11, page 2, lines 26 and 27, page 4, lines 12-14, page 10, lines 20-26, and page 11, lines 20-22.) In addition, Applicants' specification describes that another advantage of the L-shaped side wall spacer resides in that, no matter what the implantation angle is at, the interface (515) between an amorphous silicon and a crystalline silicon runs substantially parallel to a surface (126) of a substrate (150). (See Applicants' specification at page 11, lines 20-26.) Furthermore, Applicants' specification describes that in the case of L-shaped side wall spacers, it is possible to fill the side wall spacers with nitride, which made the application of other layers (for example oxide layers) on top of the semiconductor device easier. (See Applicants' specification at page 13, lines 6-10.)

Because of the above-identified advantages of the L-shape of the side wall spacer, Applicants respectfully submit that there is persuasive evidence in Applicants' specification that the L-shape of the side wall spacer is significant. Because there is persuasive evidence in Applicants' specification that the L-shape of the side wall spacer is significant, the change in the shape of the side wall spacers is not a matter of obvious choice. Thus, the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. Accordingly, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Dependent Claims 2, 3, 5-10, 12 and 14-21

Claims 2, 3, 5-10, 12 and 14-21 depend from and incorporate all of the limitations of independent claim 1. Thus, Applicants respectfully assert that claims 2, 3, 5-10, 12 and 14-21 are allowable at least based on an allowable claim 1. Additionally, claims 5, 7, 8, 12, 19 and 20 are allowable for further reasons, as described below.

Claims 5, 19 and 20

Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 5, 19 and 20. Specifically, Applicants respectfully submit that the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning.

Claims 5 and 20 recite in part that “*the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm*” (emphasis added). Claim 19 recites in part that “*the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of 5 to 20 nm*” (emphasis added). The Office Action admits that En and Krivokapic do not teach the above-identified limitations of claims 5, 19 and 20. (See pages 4, 5 and 8 of the Office Action). The Office Action concludes that “[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm, in order to optimize the performance of the device” (emphasis added). (See pages 4 and 8 of the Office Action).

Applicants respectfully assert that the Office Action merely provides a conclusory statement to support the asserted conclusion of obviousness.

Specifically, the Office Action does not describe what performance is being optimized. In addition, the Office Action does not describe how the teachings of En and Krivokapic would be combined to “optimize the performance of the device” (emphasis added), as asserted by the Examiner. Furthermore, the Office Action does not describe why the combination of the teachings of En and Krivokapic would “optimize the performance of the device” (emphasis added), as asserted by the Examiner. Thus, the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 5, 19 and 20.

The Office Action also asserts that “it has been held that discovering the optimum or workable ranges involves only routine skill in the art...” (See pages 5 and 8 of the Office Action).

However, Applicants respectfully assert that the assertion “it has been held that discovering the optimum or workable ranges involves only routine skill in the art...” of the Office Action is not based on a rational underpinning.

A particular parameter must first be recognized as **a result-effective variable**, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See MPEP 2144.05(II)(B).

In the case at hand, there is no mention in En that the thickness of a portion of the spacers (58) is a result-effective variable. Since the thickness of a portion of the spacers (58) is not recognized as a result-effective variable in En, the claimed distance cannot be characterized as routine experimentation. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, Applicants respectfully assert that the thickness of the second portion of the L-shaped side wall spacer “of maximally 40 nm” (emphasis added) as recited in claims 5 and 20 and “of 5 to 20 nm” (emphasis added) as recited in claim 19 is critical and achieves unexpected results.

MPEP 2144.05 states:

Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

For example, Applicants’ specification at Fig. 11 and page 11, lines 6-8, describes that, compared to an L-shaped sidewall spacer with a second portion, which extends along a surface of a semiconductor body, that has a thickness of more than 40nm, an L-

shaped sidewall spacer with a second portion that has a thickness of maximally 40 nm prevents an effect of an amorphization implantation from getting too low and results in an improved operation of a semiconductor device. Thus, the claimed dimension is critical and achieves unexpected results. As a result, Applicants respectfully assert that the teachings of En and Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claims 5, 19 and 20.

Furthermore, Applicants respectfully assert that a semiconductor device having the claimed relative dimensions performs differently than a device without the claimed relative dimensions.

MPEP § 2144.04(IV)(A) states:

In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. (emphasis added)

For example, Applicants' specification at Fig. 11 and page 11, lines 6-8, describes that, compared to an L-shaped sidewall spacer with a second portion, which extends along a surface of a semiconductor body, that has a thickness of more than 40nm, an L-shaped sidewall spacer with a second portion that has a thickness of maximally 40 nm prevents an effect of an amorphization implantation from getting too low and results in an improved operation of a semiconductor device. Because a semiconductor device having the claimed dimensions performs differently than a device without the claimed relative dimensions, Applicants respectfully assert that the teachings of En and Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claims 5, 19 and 20.

Claims 7 and 8

Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 7 and 8.

Claim 7 recites in part that “*the semiconductor body comprises a germanium component.*” Claim 8 recites in part that “*the semiconductor body comprises a strained-silicon layer.*” It appears that the Office Action admits that En and Krivokapic do not teach the above-identified limitations of claims 7 and 8. (See page 5 of the Office Action). However, the Office Action concludes that “[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the semiconductor body comprises a germanium component or strained-silicon layer of Krivokapic in En, in order to optimize the performance of the device” (emphasis added). (See pages 4 and 8 of the Office Action).

However, the Office Action merely provides a vague conclusory statement to support the asserted conclusion of obviousness. Specifically, the Office Action does not describe what performance is being optimized. In addition, the Office Action does not describe how the teachings of En and Krivokapic would be combined to “optimize the performance of the device” (emphasis added), as asserted by the Examiner. Furthermore, the Office Action does not describe why the combination of the teachings of En and Krivokapic would “optimize the performance of the device” (emphasis added), as asserted by the Examiner. Thus, the alleged reasoning provided in the Office Action to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 7 and 8.

Claim 12

Claim 12 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En in view of Krivokapic. However, Applicants respectfully note that the Office Action relies on Yang to teach the limitation “*the metal is palladium (Pd)*” of claim 12. (See page 6 of the Office Action). Because Yang was relied on to reject claim 12 and Yang was not cited by the Examiner in the rejection of claim 12, Applicants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 12.

CONCLUSION

Generally, in this Response to Office Action, Applicants may have not raised all possible grounds for (a) traversing the rejections of the Office Action or (b) patentably distinguishing any new or currently amended claims (i.e., over the cited references or otherwise). Applicants however, reserve the right to explicate and expand on any ground already raised and/or to raise other grounds for traversing and/or for distinguishing, including, without limitation, by explaining and/or distinguishing the subject matter of the Application and/or any cited reference at a later time (e.g., in the event that this Application does not proceed to issue with the current pending claims, or in the context of a continuing application). Applicants submit that nothing herein is, or should be deemed to be, a disclaimer of any rights, acquiescence in any rejection, or a waiver of any arguments that might have been raised but were not raised herein, or otherwise in the prosecution of this Application, whether as to the original claims or as to any of the new or amended claims, or otherwise. Without limiting the generality of the foregoing, Applicants reserve the right to reintroduce one or more of the original claims in original form or otherwise so as to claim the subject matter of those claims, both/either at a later time in prosecuting this Application or in the context of a continuing application.

Applicants respectfully request reconsideration of the claims in view of the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted on behalf of:

NXP N.V.

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